

FORM PTO-1399 (REV. 11-2000)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				I-2-127.1US	
				U.S. APPLICATION NO. (If known, see 37 CFR 1.5 Not Yet Known) 09/880391	
INTERNATIONAL APPLICATION NO. PCT/US99/20652		INTERNATIONAL FILING DATE 12/23/2001		PRIORITY DATE CLAIMED 02/05/1999	
TITLE OF INVENTION COMMUNICATION STATION WITH AUTOMATIC CABLE LOSS COMPENSATION					
APPLICANT(S) FOR DO/EO/US John Bird and Leonid Kazakevich					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</p> <p>4. <input type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input checked="" type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input type="checkbox"/> has been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p>a. <input type="checkbox"/> is attached hereto.</p> <p>b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).</p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input type="checkbox"/> have been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input checked="" type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p>					
Items 11 to 20 below concern document(s) or information included:					
<p>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input type="checkbox"/> A FIRST preliminary amendment.</p> <p>14. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>15. <input checked="" type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.</p> <p>18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input checked="" type="checkbox"/> Other items or information:</p> <p>1) Four (4) sheets of Drawings in triplicate; 2) Copy of the Published International Application with Search Report; 3) Copy of the International Preliminary Examination Report with Annex of Amended Sheets; 4) Communication Regarding Substitute Specification; and 5) Application Data Sheet.</p>					

U.S. APPLICATION NO. **09/890391** (If known, see 37 CFR 1.51)
Not Yet Known

INTERNATIONAL APPLICATION NO
PCT/US99/20652

ATTORNEY'S DOCKET NUMBER
I-2-127.1US

21. ☒ The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):

Neither international preliminary examination fee (37 CFR 1.482)
nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO
and International Search Report not prepared by the EPO or JPO..... **\$1000.00**

International preliminary examination fee (37 CFR 1.482) not paid to
USPTO but International Search Report prepared by the EPO or JPO \$860.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO
but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **\$710.00**

International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4)	\$690.00
--	----------

International preliminary examination fee (37 CFR 1.482) paid to USPTO
and all claims satisfied provisions of PCT Article 33(1)-(4) **\$100.00**

ENTER APPROPRIATE BASIC FEE AMOUNT =**CALCULATIONS PTO USE ONLY**

Surcharge of **\$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total claims	16 - 20 =	0	x \$18.00
Independent claims	3 - 3 =	0	x \$80.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$270.00

TOTAL OF ABOVE CALCULATIONS =

☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.

SUBTOTAL =

Processing fee of **\$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)).

TOTAL NATIONAL FEE =

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **\$40.00** per property +

TOTAL FEES ENCLOSED =

Amount to be refunded:	\$
------------------------	----

charged:	\$
----------	----

- a. ☐ A check in the amount of \$ _____ to cover the above fees is enclosed.
- b. ☒ Please charge my Deposit Account No. 22-0493 in the amount of \$ 900.00 to cover the above fees.
A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 22-0493. A duplicate copy of this sheet is enclosed.
- d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Volpe and Koenig, P.C.
Suite 400, One Penn Center
1617 John F. Kennedy Boulevard
Philadelphia, PA 19103

SIGNATURE

Gerald B. Halt, Jr., Esquire

NAME _____

~~37,633~~

REGISTRATION NUMBER

0/PRTs

09/890391

JUL 30 2001

PCT/US99/30652

WO 00/46937

-1-

COMMUNICATION STATION WITH
AUTOMATIC CABLE LOSS COMPENSATION

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to wireless digital communications systems. More particularly, the present invention relates to a code-division multiple access (CDMA) communication system employing a base station having remotely located RF power amplification equipment.

Description of the Prior Art

10 CDMA systems provide an efficient use of the limited bandwidth of the RF spectrum, thereby permitting a greater amount of information transmission with less signal distortion than communications systems using other techniques, such as time division multiple access and frequency division multiple access.

15 In a CDMA communication system, an information signal at the transmitter is mixed with a pseudorandom spreading code which spreads the information across the entire bandwidth employed by the system. The spread signal is upconverted to an RF signal for transmission. A receiver, identified by the pseudorandom spreading code, downconverts the transmitted spread-spectrum signal and mixes this with the pseudorandom spreading code to reproduce the original information signal.

20 A prior art CDMA communication system is shown in **Figure 1**. The communication system has a plurality of base stations 20₁, 20₂, ... 20_n connected together through land lines via a local public switched telephone network (PSTN)

-2-

or by a wireless link. Each base station $20_1, 20_2, \dots 20_n$ communicates using spread spectrum CDMA transmissions with mobile and field subscriber units stations $22_1, 22_2, \dots 22_n$ located within its cellular area. Because a signal transmitted from one base station appears as noise to another base station, and thereby interferes with the ability of the second base station to receive transmissions from subscriber units located within its cellular area, it is desirable to carefully limit the amount of power transmitted from each base station $20_1, 20_2, \dots 20_n$.

A CDMA base station typically has equipment such as an RF power amplifier and related electronics (not shown) located in a sheltered ground station for reception and transmission of RF signals and an antenna, or multiple antennae, mounted at some distance from the sheltered ground station. A significant amount of RF energy is lost through the cable connecting the ground station to the antenna. Accordingly, it is advantageous to co-locate or integrate the RF amplifier and related electronics with the antenna. This arrangement results in cost savings and energy efficiency because it permits the use of a lower power RF amplifier than is necessary when the RF amplifier is located at a distance from the antenna. Although RF power is still lost in the cable which connects the ground station with the RF amplifier located at the antenna, far less power is lost than in the case where the RF amplifier is located in the ground station.

In order to control the amount of power transmitted at the antenna, the power loss through the cable must be measured and compensated. In addition, the power loss through the cable varies with temperature. This variability causes a variation in

signal level to the RF amplifier, which can result in overpowering or underpowering the RF amplifier. Overpowering the RF amplifier can cause interference with neighboring cell sites and can cause distortion of the transmitted signal which produces additional undesirable noise. Underpowering the RF amplifier can result in the transmission of a signal that is too weak to effectively communicate with the subscriber units within the cell area of the transmitter.

U.S. Patent No. 5,634,191 discloses an arrangement for a TDMA system for compensating for cable loss between separate communication system units. The transmit power level of the communication is quantized at the first communication unit and sent as data together with the communication signal to the second communication unit. At the second communication unit, the power level of the communication is again measured and compared to the quantized power level. A signal attenuator adjusts the communication power level at the second communication unit to be equivalent to the quantized power level.

The measurement of the power of an RF signal received by a base station is also critical to an effective CDMA system. Since this measurement is typically made at the ground station, variability in power loss through the cable also adversely affects the accuracy of the received power measurement.

Accordingly, there is a need for continuous, automatic compensation of the power loss in the cable between the antenna and the ground station in order to effectively control RF transmission power from the base station and more accurately to measure power received from subscriber units.

-4-

Accordingly, it is an object of the present invention to provide automatic cable loss compensation for a CDMA communication station having remotely located RF power amplification equipment

Other objects and advantages of the present invention will become apparent after reading the detailed description of the presently preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an illustration of a prior art CDMA system.

Figure 2 is an illustration of a base station made in accordance with the present invention with an RF power amplifier located remotely from a ground station.

Figure 3 is a block diagram of a CDMA ground station with remotely located RF power amplifier and antenna in accordance with the present invention.

Figure 4 is a flow diagram of a method for adjusting cable compensation attenuators in accordance with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments will be described with reference to the drawing figures where like numerals represent like elements throughout.

A communications network employing the present invention is shown in Figure 1. The communications network includes a plurality of base stations 20₁, 20₂, ... 20_n, each of which supports wireless communication with mobile and fixed

-5-

subscriber units $22_1, 22_2, \dots 22_n$ that are located within the coverage area of the respective base station $20_1, 20_2, \dots 20_n$.

Referring to **Figure 2**, a base station **100** with ground-based receiving and transmitting equipment **300**, a remotely located mast head unit **320** and an antenna **360** mounted upon a tower **112** is shown. The mast head unit **320** includes an RF power amplifier and related electronics. A coaxial cable **340** conveys RF signals between the ground-based equipment **300** and the mast head unit **320**. These signals include the incoming signals which are received from subscriber units $22_1, 22_2, \dots 22_n$ at the antenna **360**, processed by the mast head unit **320** and forwarded to the ground-based equipment **300**; and the outgoing signals which are received by the ground-based equipment **300** forwarded to the mast head unit **320** and transmitted to the subscriber units $22_1, 22_2, \dots 22_n$. A separate cable assembly **350** conveys amplifier prime power and control signals to and from the mast head unit **320**.

A detailed schematic of a base station **100** with a remotely located RF power amplifier is shown in **Figure 3**. The ground-based equipment **300** receives a signal to be transmitted (Tx), which has already been upconverted to the desired transmission frequency. An infinitely variable attenuator **308** adjusts the Tx signal level to limit power output as appropriate for the transmission area (cell size) of the base station **100**. A touchpad front panel control **310** permits manual adjustment of the cell size attenuator **308**. This adjustment is controlled by a microcontroller **311** which may also receive a command via a communications link **313** to provide remote adjustment of the cell size attenuator **308**.

-6-

The level-adjusted Tx signal is level adjusted a second time by a variable cable compensation attenuator 401 and is buffered by a transmission preamplifier 309. A first power level detector 402 measures the power of the level adjusted Tx signal and the Tx signal is then forwarded through an input signal diplexer 307 to the RF cable 340. A diplexer allows bidirectional transmission of signals on a single cable. Thus, the input signal diplexer 307 and output signal diplexer 301 permit the level-adjusted Tx signal to be sent on the RF cable 340 while also simultaneously permitting reception of a level-adjusted received (Rx) signal from the mast head unit 320.

The Tx signal is sent through the RF cable 340 to an output diplexer 301 in the mast head unit 320. A second power level detector 403 in the mast head unit 320 measures the power of the signal to be transmitted after it has passed through the input diplexer 301. The signal is then amplified by a high power amplifier (HPA) 304 and routed through an antenna diplexer 303 for transmission by the antenna 360.

Power for the electronics in the mast head unit 320 and other control signals are supplied from the ground-based equipment 300 by power and control cable 350.

A signal from a subscriber unit $22_1, 22_2, \dots 22_n$ which is received at the antenna 360, is routed through the antenna diplexer 303 to a low noise amplifier (LNA) 302. The received (Rx) signal is amplified by the LNA 302 and routed through the output diplexer 301 and then is conveyed to the ground based equipment 300 through the RF cable 340. The Rx signal is stripped off the RF cable 340 by the input diplexer 307. The received signal is level adjusted by a second variable cable

compensation attenuator **404** and then buffered by an amplifier **306** and routed to downconverter equipment (not shown).

A microcontroller **305** in the mast head unit **320** sends the power measurement made at the second power level detector **403** to the microcontroller **311** in the ground-based equipment **300**. The microcontroller **311** in the ground-based equipment **300** compares the power level measured at the output of the transmission pre-amplifier **309** with the power level measured at the input to the high power amplifier **304** in the mast head unit **320**. The microcontroller **311** then adjusts the first variable cable attenuator **401** to maintain a constant power level at the input to the high power amplifier **304**, and makes an identical adjustment to the second infinitely variable cable attenuator **404** to compensate for the effect of variable cable loss on the received signal. The control system comprising ground-based power level detector **402**, mast head unit power level detector **403**, the first and second variable cable attenuators **401**, **404**, mast head microcontroller **305**, and ground-based unit microcontroller **311** provides a continuous automatic adjustment for the variable loss associated with the RF cable **340**.

An alternate embodiment of the invention combines cell size attenuator **308** with cable compensation attenuator **401**, whereby the attenuation range of the combined attenuator is sufficiently large to accommodate the range required by both of the attenuators **308**, **401**.

Figure 4 shows the procedure **400** for cable loss compensation **400** which adjusts cable compensation attenuators **401**, **404** in accordance with the present

invention. The cable compensation method **400** is designed to adjust cable loss to between a predetermined lower limit, (A), and a predetermined upper limit, (B). In this procedure **400**, cable loss includes the effect of the first cable compensation attenuator **401**. At step **410**, a measurement of cable loss (L) is made by comparing the RF power level measured at the first power detector **402** with the RF power level measured at the second power level detector **403**. At step **412**, cable loss L is compared to predetermined limits lower and upper limits A and B respectively. If the cable loss L is between lower limit A and upper limit B, or is equal to either limit, then no further adjustment is made and the cable loss compensation procedure terminates at block **414**. If the cable loss L is either higher than upper limit B or lower than lower limit A, then a further comparison is made a step **416**. At step **416**, a determination is made whether the cable loss L is lower than lower limit A. If so, then the gain of the cable attenuators **402**, **403** is decreased, as shown at step **420**. If the cable loss L is not lower than lower limit A, it must be higher than upper limit B, and the gain of the cable attenuators **402**, **403** is increased as shown at step **418**. Upon completion of an increase or decrease of cable loss compensator gain at step **418** or **420**, cable loss L is again measured at block **410**. This procedure is repeated until cable loss L is brought within the predetermined limits A, B and the compensation procedure terminates at step **414**. The cable compensation procedure **400** may be performed on a repeated basis at a rate which is appropriate for maintaining constant output power under conditions which cause cable loss L to fluctuate.

-9-

Although the invention has been described in part by making detailed reference to certain specific embodiments, such details is intended to be instructive rather than restrictive. Although the invention has been described in the preferred embodiment for use in a CDMA communication system, it is equally applicable to other types of communication systems such as Timed Division Duplex (TDD), Frequency Division Duplex (FDD), Multimedia Distribution System (MDS), Local Multipoint Distribution Systems (LMDS), Unlicense National Information Infrastructure/National Information Infrastructure (UNII/NII), next generation and other cellar radio communication systems. It will be appreciated by those skilled in the art that many variations may be made in the structure and mode of operation without departing from the spirit and scope of the invention as disclosed in the teachings herein.

*

*

*

What is claimed is:

1. An attenuation compensation system for use in a base station having a mast head unit remotely connected to ground-based equipment by a cable, whereby a signal sent from said ground-based equipment to said mast head unit experiences attenuation, the system comprising:

5 at said ground-based equipment (300):

a first power level detector (402) coupled to a transmit signal line for outputting a first power level signal;

a compensation attenuator (401) coupled to the transmit signal line;

10 at least one controller for controlling the compensation attenuator (401); and

at said mast head unit (320):

15 a second power level detector (403) coupled to the transmit signal line for outputting a second power level signal, said second power level detector having means for transmitting the second power level signal to said ground-based equipment; said second power level signal being based upon the amount of said attenuation;

whereby said controller (301) compares said first and second power level signals and controls the compensation attenuator (401) accordingly.

2. The attenuation compensation system as recited in claim 1 further comprising a second compensation attenuator (404) coupled to a receive signal line.

3. The attenuation compensation system as recited in claim 2 wherein the controller (311) controls the second compensation attenuator (404).

4. The attenuation compensation system as recited in claim 1 further comprising a power and control cable (350) connected between the mast head unit and the ground-based equipment for carrying control signals between the first and second power level detectors (402, 403).

5. The attenuation compensation system as recited in claim 2 further comprising a first diplexer (307) located in the ground-based equipment and coupled to the receive signal line, the transmit signal and the cable.

6. The attenuation compensation system as recited in claim 1 wherein the ground-based equipment further comprises a cell size attenuator (308) coupled to the transmit signal line.

7. The attenuation compensation system as recited in claim 1 wherein the ground-based equipment further comprises a transmit pre-amplifier coupled (309) to the transmit signal line.

8. The attenuation compensation system as recited in claim 2 further comprising a second diplexer (301) located in the mast head unit and coupled to the receive signal line, the transmit signal line and the cable.

9. The attenuation compensation system as recited in claim 1 wherein the mast head unit further comprises a high power amplifier (304) coupled to the transmit signal line.

10. The attenuation compensation system as recited in claim 2 wherein the mast head unit further comprises a low noise amplifier (302) coupled to the receive signal line.

11. The attenuation compensation system as recited in claim 2 wherein the mast head unit further comprises an antenna diplexer (303) coupled to an antenna (360), the transmit signal line, and the receive signal line.

12. A method of compensating for cable loss in a wireless communication system having a high power amplifier (304) located proximate an antenna, a pre-amplifier (309) receiving a transmit signal located at a remote location, and a cable (340) connected between the amplifiers, the method comprising the steps of:

5 detecting a first power level of the transmit signal at an output of the pre-amplifier (309);

detecting a second power level of the transmit signal at an input of the high power amplifier (304);

10 feeding back the second power level from said proximate location to said remote location;

comparing, at said remote location, the first and second power levels to determine a loss in the cable;

adjusting a compensation attenuator (401) coupled to the pre-amplifier based upon the loss.

13. The method of compensating for cable loss as recited in claim 12 wherein a gain of the cable compensation attenuator (401) is increased if the loss is below a lower limit.

14. The method of compensating for cable loss as recited in claim 12 further comprising the steps of:

comparing the loss to upper and lower limits;

maintaining the gain of the cable compensation if the loss is between the limits;

increasing the gain of the cable compensation if the loss is below the lower limit; and,

decreasing the gain of the cable compensation if the loss is above the upper limit.

15. The method of compensating for cable loss as recited in claim 12 further comprising adjusting the gain of a second cable compensation attenuator (404) coupled to a receive signal based upon the loss.

16. An attenuation compensation system for use in a base station having at least one cable extending between first and second locations, the system comprising:

power level detection means for determining transmit signal power level at said first location and at said second location;

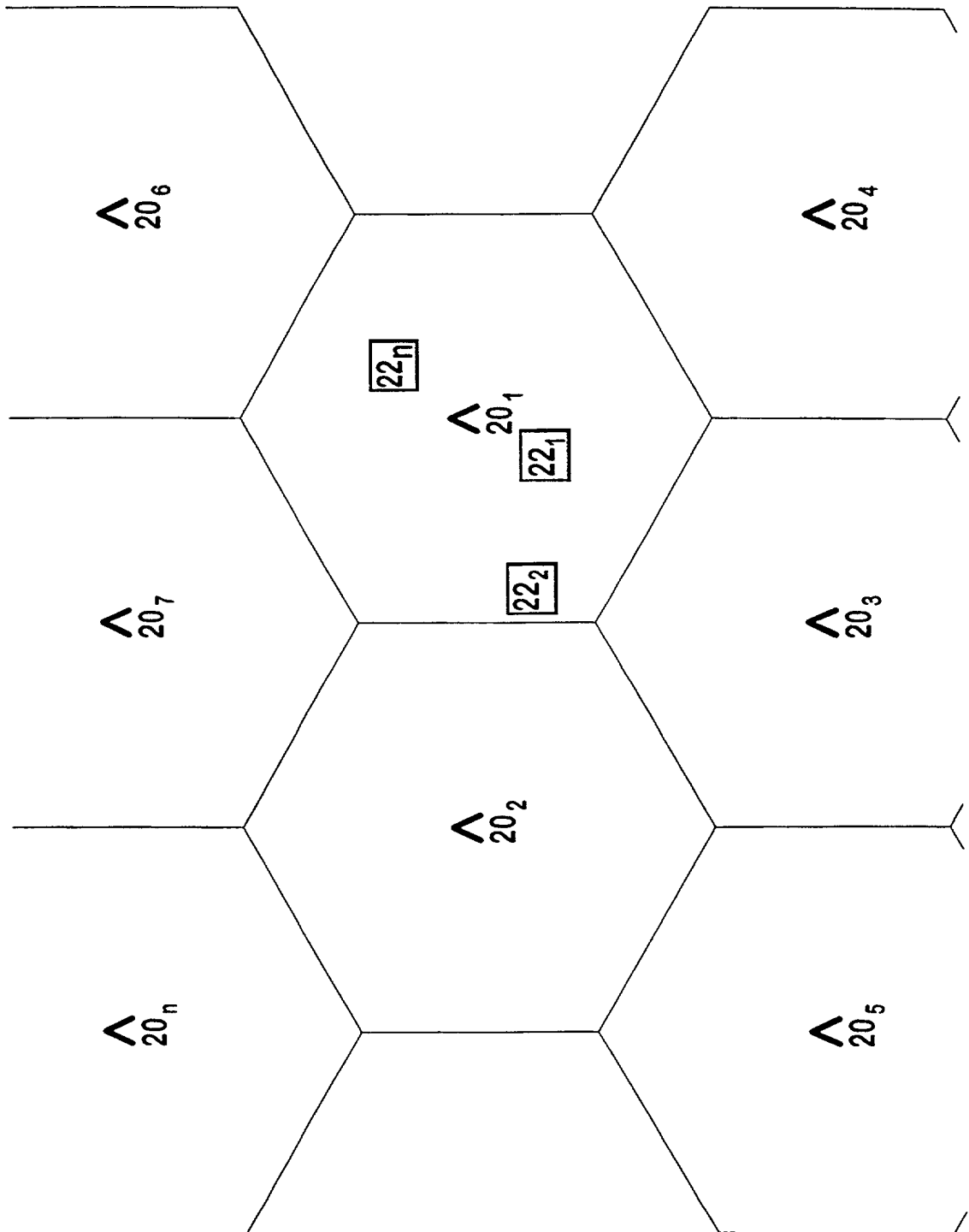
feed back means for feeding back the transmit signal power level from said second location to said first location;

comparing means at the first location for comparing power levels from the power level detection means and for determining a loss between the two locations;

attenuating means at the first location for controlling the power level of the transmit signal; and,

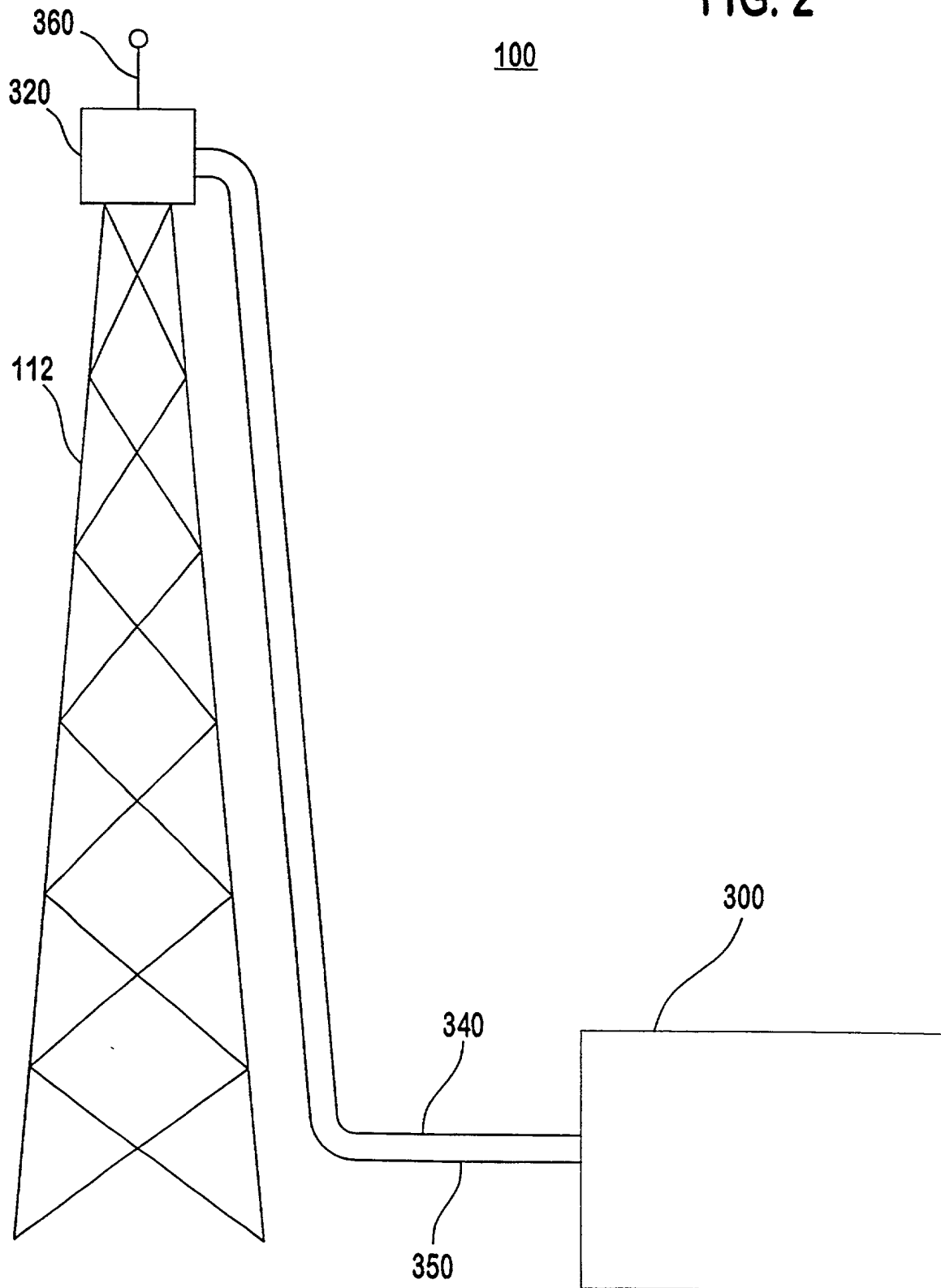
control means at the first location responsive to the comparing means for controlling the attenuating means.

FIG. 1



2/4

FIG. 2



3/4

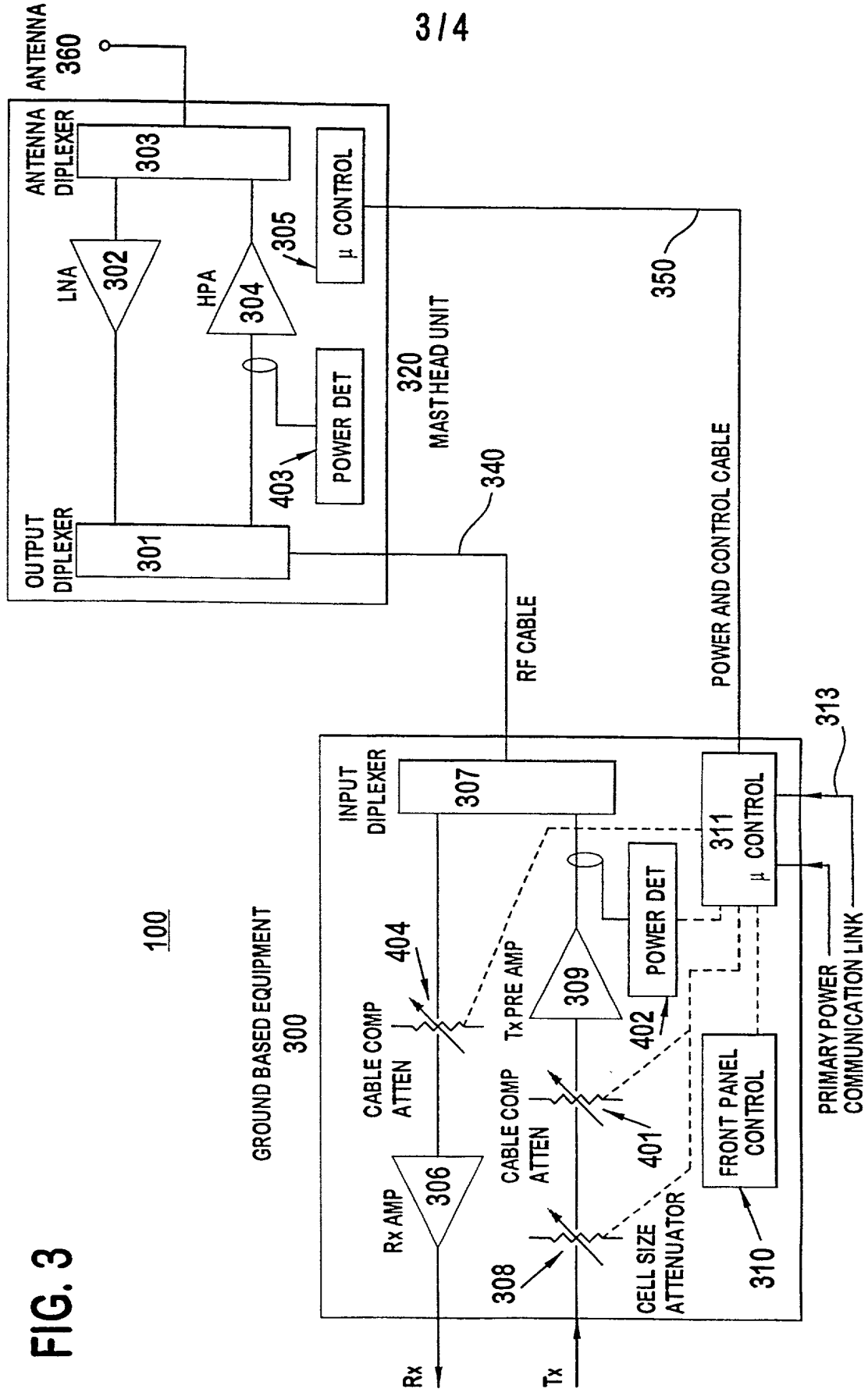
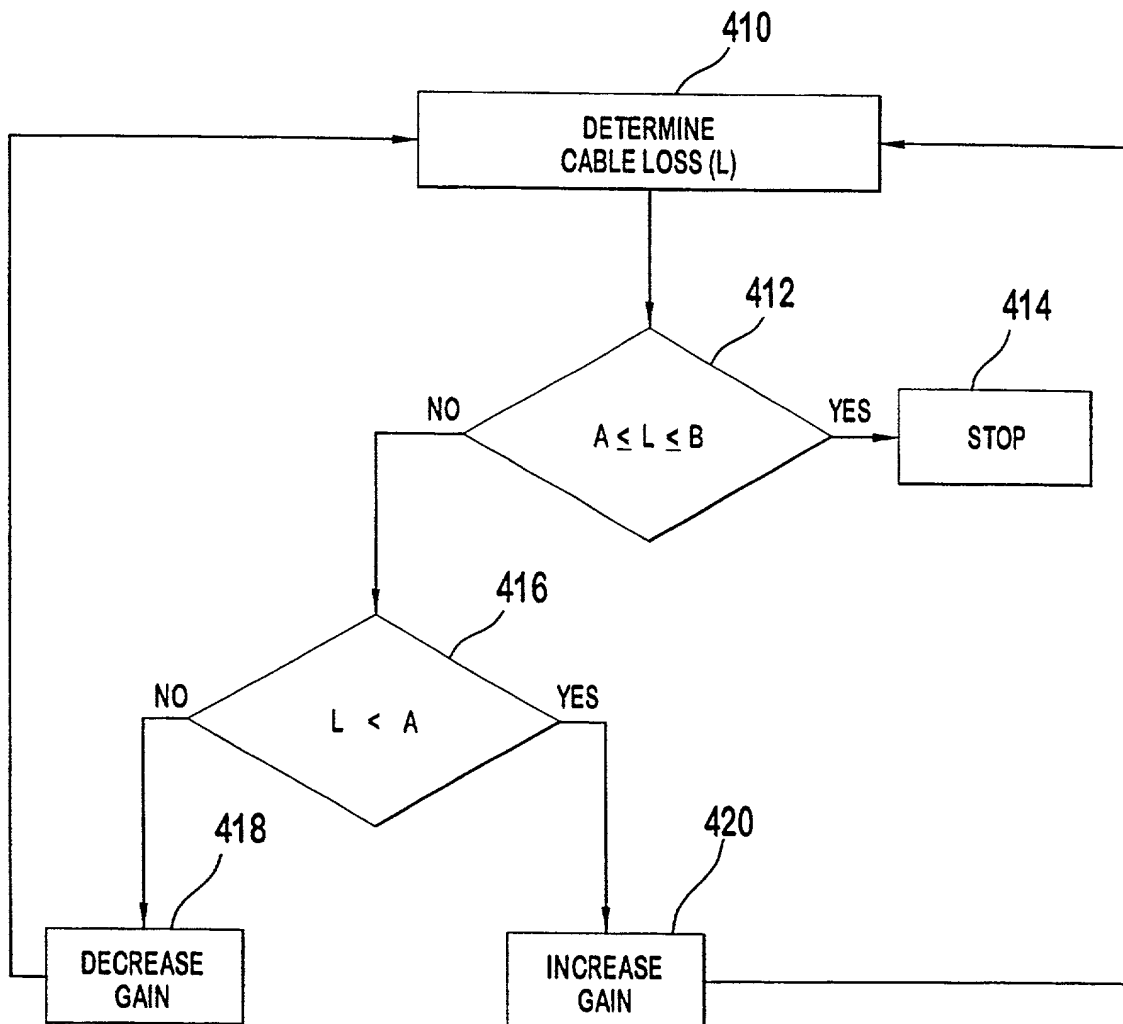


FIG. 3

FIG. 4

4/4

400

Please type a plus sign (+) inside this box → ☒

PTO/SB/01 (12-97)

Approved for use through 9/30/00. OMB 0651-0032

Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63) <input checked="" type="checkbox"/> Declaration Submitted with Initial Filing OR <input type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)	Attorney Docket Number	I-2-127.1US
	First Named Inventor	Bird et al.
	COMPLETE IF KNOWN	
	Application Number	Not Yet Known
	Filing Date	Not Yet Known
	Group Art Unit	Not Yet Known
	Examiner Name	Not Yet Known

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

COMMUNICATION STATION WITH AUTOMATIC CABLE LOSS COMPENSATION

the specification of which

(Title of the Invention)

☒ is attached hereto
OR☐ was filed on (MM/DD/YYYY) [] as United States Application Number or PCT International

Application Number [] and was amended on (MM/DD/YYYY) [] (If applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(e) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
	USA		<input type="checkbox"/>	YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.
60/118,824	02/05/1999	

[Page 1 of 2]

Burden Hour Statement: This form is estimated to take 0.4 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Washington, DC 20231.

Please type a plus sign (+) inside this box → ☐

PTO/SB/01 (12-97)
Approved for use through 9/30/00. OMB 0551-0032
Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION — Utility or Design Patent Application

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 355(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)
PCT/US99/30652	12/23/1999	

☐ Additional U.S. or PCT international application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

<input checked="" type="checkbox"/> Customer Number <u>24374</u> → <div>Place Customer Number Bar Code Label here</div>			
<input type="checkbox"/> Registered practitioner(s) name/registration number listed below			
Name	Registration Number	Name	Registration Number
Namely, the Attorneys of Volpe and Koenig, P.C.			

☐ Additional registered practitioner(s) named on supplemental Registered Practitioner Information sheet PTO/SB/02C attached hereto.

Direct all correspondence to: ☒ Customer Number or Bar Code Label 24374 OR ☐ Correspondence address below

Name	VOLPE AND KOENIG, P.C. DEPT ICC				
Address					
Address					
City		State		ZIP	
Country		Telephone		Fax	

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor:		<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle (if any))		Family Name or Surname			
John		Bird			
Inventor's Signature	<u>John F. Bird</u>			Date	7/26/01
Residence: City	Huntington Station	State	NY	Country	USA
Post Office Address	66 Oakley Drive				
Post Office Address					
City	Huntington Station	State	NY	ZIP	11746
				Country	USA

☒ Additional inventors are being named on the 1 supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto

Under the Paperwork Reduction Act of 1996, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION

ADDITIONAL INVENTOR(S)
Supplemental Sheet
Page 1 of 1

Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])		Family Name or Surname	
Leonid		Kazakevich	
Inventor's Signature <i>[Signature]</i>		Date 7/26/01	
Residence: City	Plainview	State	NY
		Country	USA
		Citizenship	US
Mailing Address 95 Roundtree Drive			
Mailing Address			
City	Plainview	State	NY
		ZIP	11803
		Country	USA
Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])		Family Name or Surname	
Inventor's Signature		Date	
Residence: City		State	
		Country	
		Citizenship	
Mailing Address			
Mailing Address			
City		State	
		ZIP	
		Country	
Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])		Family Name or Surname	
Inventor's Signature		Date	
Residence: City		State	
		Country	
		Citizenship	
Mailing Address			
Mailing Address			
City		State	
		ZIP	
		Country	

Burden Hour Statement: This form is estimated to take 21 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.